



Examining the Effectiveness of Official Development Assistance in Sub-Saharan African Countries

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The overall effectiveness of foreign aid in developing countries has been a long-contested topic in the realm of development economics. Foreign aid programs were implemented prior to extensive knowledge being gathered to evaluate if they would work to achieve the main objective: to reduce poverty and increase overall economic growth in aid recipient countries (Boone 1995). Economists worldwide have since conducted numerous studies hoping to gain a better understanding of how foreign aid affects impoverished and underdeveloped countries.

Many different studies, such as one conducted by Sebastian Edwards (2014) regarding the effectiveness of foreign aid, pertain to a variety of topics in question regarding foreign aid in specific countries or regions: long-term effects, short-term effects, government size, government political affiliation, percent of change in population under or over the poverty line, effective distribution, and equal distribution. It is often brought into question how foreign aid programs are affected by differing political standpoints. The opposing viewpoints surrounding this topic are mostly rooted in political ideology, but also have validity from an economic standpoint. Critics of foreign aid have cited poor growth patterns in countries that receive large amounts of aid, namely those in the Sub-Saharan African region. Moreover, many prominent economists have been skeptical of proper implementation and distribution of aid packages, hoping to avoid feeding the financial elites of other countries or perpetuating government corruption.

On the other hand, many have praised foreign aid as a major driving force behind the economic development of low-income countries. While the main goal of foreign aid programs typically is to expand or further develop a certain country's economy, in some developing countries, foreign aid programs can also offer resources to those who need them desperately, which is an important aspect to consider when evaluating the effectiveness of foreign aid. In a world where leaps in technology have connected virtually everyone around the world, the poorest countries may not yet have access to some key technologies or infrastructure development. This is problematic because these low-income countries may fall behind developed countries and may lack the resources to improve infrastructure, foster education or improve healthcare systems. These are all areas in which foreign aid can be useful for the low-income countries in question.

This research will focus specifically on the impact of Official Development Assistance [ODA] as measured by the Organization for Economic Cooperation and Development [OECD]¹. ODA specifically measures the amount of monetary assistance provided to developing countries by donor governments through the process of loan disbursements. The goal of this assistance is to promote economic growth and development in low- or middle-income countries. Bringing economic welfare to these countries can manifest in many different observed effects, as there are many indicators by which to measure economic development.

¹ Note that while the data was obtained through World Bank databases, these data are aggregated from other sources. Individual data sources and detailed definitions can be viewed in *Table 1*.

World Bank Senior Economist Charles Kenny (2006) suggests it is difficult to determine the effectiveness of ODA in general terms, and thus a certain level of specificity is required to measure the effects of ODA in developing countries. Sub-Saharan African countries receive fairly large amounts of inflows from ODA, which draws attention for those who hope to determine the effectiveness of ODA. Moreover, measures have been taken to clearly outline a collection of indicators that might be attributed to increases in ODA. These indicators hope to capture the general economic well-being of the surveyed countries, while also providing specificity in the model's results. For this reason, the effectiveness of ODA is measured through its correlation with Life Expectancy, Primary School Enrollment, Agriculture Value-Added, and the Age-Dependency Ratio of each surveyed country.

The primary goal in completing this research is to contribute to the plethora of existing knowledge pertaining to foreign aid effectiveness in Sub-Saharan African countries in the hope of further understanding this issue. The basis of this research is somewhat similar to that of existing literature in the field. This research contributes to the field by examining ODA effectiveness through a unique amalgamation of economic growth and development outcomes.

There are six major sections of this document to follow. First, a theoretical framework is provided, detailing the conditions which make aid effective or ineffective. Following this, I provide a brief literature review that demonstrates the findings of previous studies on foreign aid usage. Moving forward, a summary of the studied data is given. After outlining the method of analysis, I move forward by discussing the results before a brief conclusion. All references can be viewed at the end of this document.

II. THEORETICAL FRAMEWORK

A donor country may distribute ODA to achieve a breadth of outcomes. Understanding these outcomes, desirable or otherwise, helps to inform the variables chosen for the following empirical analysis. ODA may be distributed for numerous reasons. ODA allows developing governments to invest in their country's infrastructure and industries. This typically leads to human development improvements as aid money is spent on improving education, healthcare, agriculture, and more. The current research takes particular interest in economic growth and development outcomes that demonstrate tangible impacts of ODA.

However, these are not the only reasons for which aid is distributed. A donor country could distribute aid to provide disaster relief or help mitigate other economic crises. This has been of particular importance in the Sub-Saharan African region, as detailed by Bräutigam and Knack (2004). The authors suggest that aid helps developing countries combat the issues of low domestic revenue and government inefficiency. Unfortunately, it is often the case that the countries that benefit the most from aid are rife with the obstacles that prevent successful aid usage.

There are additional incentives for providing aid that do not specifically pertain to economic growth and development. For example, donors may distribute aid to countries where they desire political influence or support. Providing aid on this basis may not be the most efficient for

development, as the conditions for receiving aid may not be as strict, which leads to improper aid distribution within the receiving country. As such, aid pessimists have numerous reasons to be skeptical of ODA effectiveness. Effectiveness of ODA depends on proper implementation, which can fail in countries with corrupt government institutions.

The conditions for which aid is given can also influence aid effectiveness. Donors may struggle to find workable conditions for the receiving countries. While a lack of conditions may lead to inefficient use of aid, excessive conditions will likely yield the same result. Additionally, aid conditions also require proper enforcement from the donor. Economic research on conditionality makes note of a “Samaritan’s dilemma,” in which withdrawing aid may negatively impact the same people it is designated to help (Svensson 2003). As such, aid conditions must be properly balanced and flexible in order to maximize effectiveness.

While the current research cannot account for all the intricacies surrounding ODA effectiveness, the following empirical method provides a widespread regional analysis. While certain uses of ODA lead to unwanted outcomes, the following analysis demonstrates a net positive effect on the outcome variables that are studied.

III. LITERATURE REVIEW

The current literature on foreign aid and economic development is diverse. One of the main issues covered by literature is the existence of other variables that affect the relationship between foreign aid and growth. These variables include political or economic instability, economic policy, and governance.

Kin-Boon Tang and Diya Bundhoo (2017) study the relationship between foreign aid and economic growth from 1990 to 2012 in ten Sub-Saharan African countries. They find that the effectiveness of foreign aid can depend on the economic policy, as well as the political and institutional environment of the state. Foreign aid interacts positively with quality policy and leads to growth. These findings are important because political instability, corruption or other variables could affect the results. For example, Salisu and Ogwumike (2010) find that the economic instability in Sub-Saharan Africa hinders foreign aid effectiveness in these countries. This issue is well-studied in contemporary literature, but other studies also focus on different conditions for aid effectiveness. These include the distribution of aid, short-run and long-run effects, and aid’s interactions with economic policy.

One such study, Velidinah (2014), finds that ODA does *not* lead to economic growth in the short term. The author suggests in his “Policy Implications” section that official development assistance be targeted to Kenya’s productive sectors to “complement current investments and attract new investments”. The application of these findings could be very limited because the author only examines Kenya. In contrast, the current research includes numerous countries [including Kenya] in the analysis of ODA.

On the topic of short-run impacts, Gillanders (2016) finds that foreign aid does cause economic growth, but the initial impact is hindered by other reactions which lead to overall insignificance of aid. His results also show that aid increases human development in democracies, but the

overall impact on human development was unclear. Notably, Gillanders measures human development by life expectancy growth, which closely relates to a variable studied in the current research.

Ogundipe and Ojeaga (2014) study another factor which impacts foreign aid's effect on economic growth. The authors find that foreign aid does not affect growth in a meaningful way until macroeconomic policy comes into play. The presence of effective laws and law enforcement is also found to be impactful. This implies that foreign aid is used more efficiently when paired with relevant macroeconomic policy that is well enforced. Despite this, Bräutigam and Knack (2004) find that higher amounts of aid can weaken governance, which has long-term growth and development implications. While weak governance is already problematic for numerous policy reasons, it can also cause future aid to be less effective [as is seen from previous literature].

Another key indicator for aid effectiveness is the severity of inequality in developing countries. After examining data from the years 1970 to 1995 and from 21 countries, Herzer and Nunnenkamp (2012) find that "aid exerts an inequality-increasing effect on income distribution". Likewise, Briggs (2017) examines foreign aid in Africa and determines that aid is not being distributed to ameliorate poverty. However, De and Becker (2015) find a positive relationship between aid and living standard in Malawi. Specifically, they find that foreign aid has a positive impact on healthcare, education, and access to clean water.

In contrast to the aforementioned literature, Houdou and Njoupouognigni (2010) attempt to correct a mistake by previous scholars who have researched foreign aid and its relationship with economic growth. They find "strong positive evidence" between growth, saving and labor and foreign aid and foreign direct investment. Saving and labor are internal factors, while foreign aid and foreign direct investment are external factors. The authors claim labor is the key contributor to growth in Sub-Saharan Africa. This means that these countries can focus on internal or domestic factors rather than receiving aid.

IV. DATA OVERVIEW

To determine the effectiveness of ODA in developing Sub-Saharan Africa, panel data consisting of annual observations for numerous countries was collected. Countries were selected on a geographic basis, with each observed country being located within the southeastern region of Africa. This selection was made to control for potential geographic variation and its effect on the domestic economy of each country. In addition to being in the same region, each country shares at least one border with at least one other country selected for the study. Observations were collected from 1960 to 2019 [60 years], and 11 countries are observed per year. The countries included in the analysis, listed in alphabetical order, are as follows: *Burundi, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Somalia, Tanzania, Uganda, Zambia, and Zimbabwe*.

To best capture the overall impact of ODA, I collected a wide array of data for each observed country. These observations are all taken on an annual basis, which is integral to the research methodology. I collected a handful of basic macroeconomic indicators, including GDP, Gross

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Fixed Capital Formation [GFCF] (% of GDP), Government Expenditure (% of GDP), Total Population, and Inflation (measured by percent change in domestic CPI). Additionally, numerous development indicators were used to capture the effects of ODA in developing countries. These variables included Life Expectancy (from birth), Gross Primary School Enrollment (%), Agriculture Value-Added (%) and the Age-Dependency Ratio. All data was readily available through the World Bank, though sources for these data differ by variable because they are aggregated from different organizations. A full list of detailed variable definitions and sources can be found in below in *Table 1*. A full list of descriptive statistics for these variables can be found in *Table 2*, immediately below the first.

Table 1 - Variable Definitions

Variables	Definitions	Source
Country	The country in which each observation is taken.	Panel Data Observation
Year	The year in which each observation is taken.	Panel Data Observation
Population	Total population using mid-year estimates, regardless of legal status or citizenship	United Nations Population Division. World Population Prospects: 2019 Revision.
Gross Domestic Product	The total annual Gross Domestic Product, taken in Current U.S. Dollars	World Bank national accounts data, and OECD National Accounts data files.
Gross Fixed Capital Formation	Domestic Government Fixed Investment including land improvements, construction, and equipment, taken as a % of GDP	World Bank national accounts data, and OECD National Accounts data files.
Government Expenditure	General Government Final Consumption Expenditure, taken as a % of GDP	World Bank national accounts data, and OECD National Accounts data files.
Inflation (% CPI)	Measured by the % change in CPI, the price of a “basket” of goods and services (Laspeyres model).	International Monetary Fund, International Financial Statistics and data files.

Life Expectancy from Birth	The number of years a newborn infant would live if patterns of mortality are held constant over the course of its life.	United Nations Population Division. World Population Prospects: 2019 Revision.
Gross Enrollment Ratio (Primary School)	The ratio of total enrollment, regardless of age, to the population of the age group that corresponds to primary schooling.	UNESCO Institute for Statistics.
Agriculture Value-Added (%)	The value added to agricultural production, including forestry and fishing. The origin of value added is determined by the International Standard Industrial Classification.	World Bank national accounts data, and OECD National Accounts data files.
Age-Dependency Ratio	Ratio of dependents (15>age<64) to the working-age population. The proportion of dependents per 100 working-age workers.	World Bank derivations based on age distribution of UN Population Division data.
Official Development Assistance	Disbursements of loans provided by the Development Assistance Committee to promote economic development and welfare, taken in Current U.S. Dollars	Development Assistance Committee of the OECD, and International Development Statistics database.

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Table 2 - Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Population (Millions)	659	17.343	17.662	2.756	112.079
Inflation (% CPI)	358	13.668	18.667	-27.787	183.312
Gross Domestic Product (Billions)	551	9.280	13.641	0.119	96.108
Gross Fixed Capital Formation	426	17.291	7.608	2.000	43.081
Government Expenditure	447	14.353	4.757	2.047	39.787
Life Expectancy (Years from Birth)	648	49.976	7.074	26.172	68.7
Gross Enrollment Ratio (Primary)	456	83.397	33.941	7.870	156.404
Agriculture Value-Added (%)	526	34.128	15.842	2.744	74.867
Age-Dependency Ratio	659	95.268	8.297	71.283	112.849
Official Development Assistance (Millions)	645	610.824	760.112	0.010	4930.050

V. METHODOLOGY

A fixed effects model is used to determine the effectiveness of Official Development Assistance in developing African countries. The World Bank data is organized in a panel format, which allows for country *and* year-based observations. The fixed effects model accounts for these observation categories alongside a standard OLS regression. As such, there is no interference from a country or a year's individual conditions. The fixed effects model used is shown below:

$$(1) \quad Y_{it} = \beta_0 + \beta_1(ODA) + X_{it} + \gamma_i + \delta_t + \varepsilon_{it}$$

In this equation, i references the country in which an observation takes place, while t references the observation year. Y represents the selected outcome variables [Life Expectancy Gross Enrollment Ratio, Agriculture Value-Added and Age-Dependency Ratio], dependent on the amount of Official Development Assistance in country i during year t . X_{it} represents control variables [and their coefficients], which may also affect the tested outcome Y . These variables include macroeconomic controls such as GDP, Inflation, Gross Fixed Capital Formation [Investment], and Government Spending. γ_i and δ_t are the respective fixed effects of the individual country and year in which an observation takes place. Finally, ε_{it} is an error placeholder that is minimized in every instance of the regression.

VI. RESULTS & DISCUSSION

To determine the correlation between Official Development Assistance and some economic development indicators, multiple fixed-effect regressions are taken. The same model outlined in Section 4 is used to regress on a few outcome variables: Life Expectancy, Agriculture Value-Added, Gross Primary School Enrollment, and the Age-Dependency Ratio. Each regression includes the natural log of both ODA and GDP, while also controlling for the Inflation and Population of each observation. The full results of these regressions can be viewed in *Table 3*, but the most notable results will be discussed within this section. Many results have high statistical significance, with numerous possible implications.

Table 3: The Impact of Official Development Assistance on Economic Development Indicators

Fixed Effects (Country/Year)	Life Expectancy	Gross Enrollment Ratio (Primary)	Agriculture Value-Added (%)	Age-Dependency Ratio
Official Development Assistance	2.665***	36.237***	-4.002***	-3.010*
[nat. log. of total]	(0.747)	(3.925)	(1.108)	(1.631)
Gross Domestic Product	2.653***	23.325***	-13.739***	8.605***
[nat. log. of total]	(0.636)	(4.888)	(1.426)	(1.377)
Gross Fixed Capital Formation	-0.056	-0.307	0.018	-0.180**
[% GDP]	(0.035)	(0.245)	(0.066)	(0.0718)
Government Expenditure	0.207***	3.450***	-0.791***	0.587***
[% GDP]	(0.045)	(0.414)	(0.116)	(0.118)
Inflation	0.083**	0.326**	-0.109***	0.056
[% CPI]	(0.028)	(0.133)	(0.039)	(0.055)
Constant	-54.475**	-1071.356***	395.524***	-11.550
	(17.414)	(126.919)	(29.396)	(41.755)
Observations	288	248	284	288
Year Dummies	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes
R-squared	0.911	0.773	0.885	0.831
Number of country entities	11	11	11	11

Robust standard errors in parentheses, analytical weight by population, *** p<0.01, ** p<0.05, * p<0.1

a. *Correlations with Life Expectancy*

A fixed effects regression analysis shows a strong, statistically significant correlation between the amount of ODA received and the life expectancy of residents of a country. Specifically, the model indicates that a 1% increase in ODA inflow is correlated with an increase in life expectancy of about 3 years. This result was expected, as an increase in the amount of ODA received would theoretically help a country invest into its healthcare infrastructure, resulting in a higher average life expectancy for its citizens.

Interestingly, there is also a significant correlation between the level of government expenditure relative to GDP and average life expectancy. The possible underlying reason for this correlation is similar to the observed correlation between life expectancy and ODA received. That is, increased expenditure will help to improve the factors that affect life expectancy. However, there may not be causation in this relationship as the regression analysis indicates a weak correlation with a lower-than-normal level of statistical significance.

Some may argue that this result does not hold real-world significance due to the obviously diminishing returns to spending on life expectancy. While this argument is usually valid from a theoretical standpoint, it should not hold in reality. Referring back to *Table 2*, the mean value of Life Expectancy in the sample is just below 50 years of age. Even at its maximum value, life expectancy in the sampled countries does not meet the same level as high-income countries. While there is an inevitable drop-off in the returns of additional healthcare spending, the sample is at the developmental level which would experience this effect.

b. *Correlations with Gross Enrollment Ratio of Primary Schooling*

Another important development factor for low-income countries is the quality and accessibility of primary education to all individuals of any income range. In developing countries, investment in primary education has much higher returns than secondary education, making it a prominent measure of development goals. As expected, the results of the regression analysis reflect a positive relationship between the amount of ODA received and the accessibility of primary education.

The correlation between ODA and primary school enrollment is not unexpected, though the calculated coefficient of ODA is unexpectedly high. The regression suggests that a 1% increase in ODA received is associated with a 36.24% increase in the Gross Enrollment Ratio [GER] at the primary schooling level. It is important to note the sample range of the GER, which indicates that the minimum observed value is 7.87%, while the maximum observed value for this statistic is just over 156%. Given the wide range of the sample, the regression coefficient remains feasible. Adjusting the regression for clusters based on country reduces the coefficient of ODA on the GER, but this result holds less significance, with a heavily skewed confidence interval. As such, this regression adjustment has not been included.

Again, the model determines a positive correlation between the GER and both GDP and Government Expenditure, with a high level of statistical significance. In a similar fashion to

ODA inflow, an increased level of government spending may lead to an increase in the accessibility of education.

c. Correlations with Agriculture Value-Added

An important factor to note when considering foreign aid in a certain country and development within that country is the value added to agricultural production. Agriculture Value-Added refers to any crop or grass produced and sold within that country, including forestry and fishing. The regression analysis found a negative relationship between ODA received and Agriculture Value-Added. The results produced by the model produced suggest that a 1% increase in ODA received is associated with a 4% decrease in Agriculture Value-Added.

The negative correlation between the amount of ODA received and the Agriculture Value-Added can be attributed to a shift in a country's production distribution. As the low-income countries in the sample continue to develop their infrastructure, overall production may shift away from a large proportion of agricultural production towards an increased level of production in other areas, such as manufacturing or technology. Note that this does not necessarily mean that total agricultural production has decreased, but rather that the share of agricultural production relative to other production sectors has decreased as a country develops. This is further supported by the negative correlation between the Agriculture Value-Added percentage and GDP. GDP will generally increase over time [assuming positive growth patterns], meaning that overall output is continuing to increase, although agricultural share of production is theoretically decreasing. Thus, agricultural production itself may still increase as a country develops, especially considering the impact of newly introduced agricultural technologies that may be achieved with additional funding from government subsidies or aid.

d. Correlations with Age-Dependency Ratio

The regression on the Age-Dependency Ratio produced a negative coefficient with ODA, most likely due to trends in Life Expectancy results related to ODA. Recall the positive relationship between ODA and Life Expectancy. This was very likely to inform the correlation between ODA and the Age-Dependency Ratio [as a proxy for Life Expectancy]. The correlation between Life Expectancy and Age-Dependency Ratio further supports this, as the average life expectancies in sampled countries do not currently meet the upper threshold for dependency status. The highest observation on the Life Expectancy variable was 68.7 years, which narrowly exceeds the threshold for dependency status, 65 years. The regression indicates that a 1% increase in ODA inflow is correlated with a 3% decrease in the age dependency ratio.

Another strong positive correlation found by the model is between Gross Domestic Product and Age-Dependency Ratio. The hypothesized reason for this result is the aforementioned relationship between GDP and Life Expectancy. As GDP increases, there is corresponding increase in Life Expectancy. This increase in Life Expectancy, according to the model, could be associated with an increase in the total population of old-aged dependents [65 years or more].

This will be especially true for countries where average Life Expectancy is approaching, but not yet reaching 65 years of age. However, in countries where this threshold has already been met, there may be less of an increase in the Age-Dependency Ratio. In summary, the correlation between GDP and the age-dependency ratio can be attributed to indirect causation due to the interaction between GDP and the mean Life Expectancy.

VII. CONCLUSION

There has always been some question regarding how effective foreign aid is in driving economic development. As mentioned previously, economists have completed a plethora of studies to better determine how foreign aid affects impoverished and underdeveloped countries. It is important to note that the arguments for and against ODA are rooted in political ideology, but also hold weight from an economic perspective.

Though the effects of foreign aid have been explored in previous publications, this research obtained notable findings through varying growth and development indicators. Additionally, the chosen development indicators are a unique contribution to existing research. Key findings include a strong statistical correlation between ODA and all four of the tested variables: Life Expectancy, Gross Enrollment Ratio, Agriculture Value-Added and the Age-Dependency Ratio. Overall, the results indicate that ODA is an effective tool to drive economic development in low-income countries. This study had no notable limitations except for limited data availability for a handful of countries.

The outcome of this research holds numerous policy implications for entities who are interested in distributing ODA to developing countries. Although there are numerous documented failures of foreign aid, the findings of this paper suggest a net positive effect for ODA usage on economic growth and development. As such, it may be valuable for a country to distribute ODA to improve their political relations, trading value, or help to industrialize a developing country. It may also be helpful for policymakers to study the most successful conditions for aid distribution.

Given these findings, it is interesting to hear several economists claim that countries are better off relying on labor within the country, as opposed to relying on foreign aid. Although their arguments hold from a theoretical standpoint, the current data findings suggest that the sampled countries have benefitted from additional ODA. With that in mind, domestic labor and foreign aid inflows may be complementary in nature. While the tested variables cannot provide a full picture of each country that was tested, the results indicate a positive overall impact on development in Sub-Saharan African countries. This opens the door for further research that may hope to argue causality between ODA and economic development using a more robust statistical model.

VIII. ACKNOWLEDGEMENTS

First and foremost, my sincerest gratitude goes to Dr. Colin Cannonier, whose time, feedback, and guidance were instrumental in completing this research. Additionally, I extend my thanks to Grace Collier, Camille Herren, and Bogle LaRue [Belmont University], who contributed to early iterations of this research. Finally, I am grateful for the immense support given to me throughout the writing and publication process by my friends, family, and peers.

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